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behind the headlines

STRATEGIC ASPECTS OF THE POLAR REGIONS

G R Lindsey

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STRATEGIC ASPECTS OF THE POLAR REGIONS

G R Lindsey

Canadian consciousness of the Arctic in general, and of the Canadian northlands in particular, has ebbed and flowed over the years. There was a high tide in the early 1960s and in the mid-1970s we are experiencing another.

In the absence of military confrontation, or of military developments which give prominence to the polar regions, the most important factors determining Canadian activity in the Arctic are economic. Major discoveries of petroleum or of other valuable minerals could stimulate intense development, not just in the technologies of extraction but also in the field of transportation. In addition, there are real concerns over sovereignty, native peoples, and the preservation of the environment. These economic, political, and social concerns are receiving adequate treatment in the current literature, but the question of the military significance of the Arctic is seldom discussed.

As the late R J Sutherland pointed out in his 1966 paper on the strategic significance of the Canadian Arctic,[1] the Arctic Ocean has been compared to the Mediterranean, a long sea between busy and important continents, and likely some day to offer a short route for communication between them. However, he also quoted an opinion that in Canada's northern region 'there is, from a military point of view, nowhere to go, and nothing to do when you get there.'

The purpose of this paper is to examine from a global rather than a Canadian point of view some of the strategic and technological considerations relating to possible military confrontation in the North and to trace the military factors from World War II into the foreseeable future.

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World War II in the Arctic regions

Of the naval operations in the Arctic in the Second World War,[2] the most important were the convoys sent from Iceland and Scotland to Murmansk (M) and Archangel (A)* in the Soviet Union. Using well-placed bases in Norway, German U-boats, aircraft, and surface ships inflicted heavy losses on both merchant ships and their escorts, although not without considerable loss themselves.† A deadly threat was posed by German battleships and cruisers in the Norwegian fjords, which tied down a large number of the heaviest British ships waiting to intercept them when they sortied out.‡ Eventually, *Scharnhorst* was sunk off the North Cape by British warships. *Tirpitz* was damaged and finally destroyed in repeated attacks by carrier- and land-based aircraft, including British and Russian bombers operating from Russian bases, and by midget submarines. Another difficulty for the convoys was the German mines laid in the approaches to Murmansk which obliged the Royal Navy to base minesweepers in that port. German success against the convoys was very dependent on aerial reconnaissance. This was most effective in the long daylight hours of summer and when the icepack restricted the more northern routings. Losses became so heavy that in the summers of 1943 and 1944 the Allies were forced to suspend the convoys to Russia.

The Norwegian bases, which were so effective against the Arctic convoys, might also have been used for operations against Atlantic shipping, were it not that the German occupation of France had provided bases even better placed for this purpose.

German surface raiders and U-boats made their passage from the Baltic Sea into the Atlantic Ocean through the North Sea (N'S') and the Greenland-Iceland-UK (GIUK) gap, and also attacked ships and shore installations as far to the northeast as the Kara Sea

* See the centrefold map. Place names cited in the text are marked on the map using the key letter(s) or number noted in following parentheses. For example, Murmansk (M) is marked M on the map.

† The Allies lost 98 merchant ships and 18 escorting warships while the Germans lost 38 U-boats.

‡ The most disastrous convoy was the ill-fated PQ 17, bound from Iceland to Archangel in July 1942. When four heavy German warships and ten destroyers moved north, the convoy's escort was withdrawn and the ships scattered. Twenty-four merchant ships were sunk, 14 by aircraft and 10 by U-boats. See David Irving, *The Destruction of Convoy PQ 17* (London 1968), and Ian Campbell, *The Kola Run* (New York 1975).

(KS). The significance of the GIUK gap was clear to the Allies, who occupied Iceland (I), the Faeroes (F), and Greenland (G), and attempted to bar the shallower waters of the gap with minefields. Iceland was an important base for aircraft and ships protecting the main North Atlantic convoys to Britain as well as those to Russia, and, to quote Churchill on its potential value to an enemy: 'It has been said "Whoever possesses Iceland holds a pistol firmly pointed at England, America, and Canada." '[3]

Although the Aleutian Islands may not qualify as polar or Arctic regions on geographical grounds, their involvement in the Second World War provides an example of military operations on North American territory against an opponent based in Asia. The Battle of Midway in 1942, the turning point in the naval war in the Pacific theatre, was linked with a simultaneous attack on the Aleutian Islands with the intention of drawing the United States carrier forces away to the north. The Japanese eventually occupied Attu and Kiska, and, later, Agattu, and it appeared that they were now well established on a direct route to the United States. In fact, the Japanese proceeded no further, but the presence of less than 10,000 men engaged about 100,000 Americans and Canadians in expensive naval, air, and land operations.[4] Advanced Allied bases were established on Adak and Amchitka, and all but 26 of the 2500 Japanese defenders were killed during the American assault on Attu. After this the Japanese abandoned the Aleutians. On balance, the Aleutian campaign proved unproductive for the Japanese in their hope of decoying the United States fleet away from Midway, although it did waste Allied resources in the expensive and unnecessary operations to recapture the outer islands. There may be lessons here for future strategic planning in the Arctic.

World War II saw limited application of airpower north of the Arctic Circle. Paratroops and air support were effectively employed by the Germans in their invasion of Norway. And the Germans used aircraft based in Norway to discover and attack the Murmansk convoys, while the British used aircraft based in Scotland, Iceland, and Murmansk, and on catapult merchantmen and escort carriers, to defend the same convoys against air, surface, and submarine attack. Bases for use in ferrying aircraft from North America to Europe were constructed at Goose Bay (GB), Fort Chimo (FC), Churchill (C), Southampton Island (SI), Baffin Island (BI), Greenland, and Iceland. A Northwest Staging Route

was established, for logistical support of forces in Alaska, and for delivery of aircraft to Russia. Canadian airfields on this route included Grande Prairie in Alberta (1), Fort St John (2), Fort Nelson (3), Williams Lake (4), Prince George (5), and Smithers (6) in British Columbia, and Watson Lake (7) and Whitehorse (8) in the Yukon. Weather reporting stations were maintained by the Allies in various scattered locations in the Arctic, including Svalbard/Spitzbergen (S). The Germans installed weather stations in eastern Greenland, Svalbard, Novaya Zemlya (NZ), and Franz Josef Land (FJ).

There was fighting on land north of the Arctic Circle in 1939 and 1940, to the west and south of Murmansk during the Soviet invasion of Finland, and on land, at sea, and in the air around Narvik (N) when the Germans invaded Norway in 1940 and the British and French sent support to the Norwegians.

Other than the iron and nickel mines in Norway and Finland, the Arctic was of little economic importance during (or before) World War II, although steps were taken to protect the cryolite mines at Ivigtut (I′) in southern Greenland, and to disable the coal mines in Svalbard. During this last operation, conducted by the Canadian army in 1941, the Norwegian and Russian inhabitants were evacuated. It represented the first time that a military force had operated on land so close to the North Pole.

Airpower in the Arctic

It was in the 1950s that the greatest attention was paid to strategic bombers, carrying nuclear bombs and using polar routes, and to air defence against such threats. Once long-range bombers could attain radii of action of several thousand miles, the great circle routes became attractive. Between the United States and the USSR, these lead over the Arctic. To increase the depth of penetration of the missions, or to maximize the payload, it became desirable to have forward bases part way along the routes. These could be used for landing and refuelling the bombers, and, once the technique of aerial refuelling had been developed, as bases for the tanker aircraft employed to 'top-up' the bombers en route. In the period before intercontinental ballistic missiles (ICBMs) replaced bombers as the main component of the strategic deterrent, bomber missions of long endurance were emphasized. These permitted an 'airborne alert,' with a number of armed bombers in the air at all

times (and consequently immune to attack at their base), and maximized deterrence by always having some bombers patrolling within a short distance of the adversary's airspace. During this period the United States air force built major northern bases in Alaska and Greenland, and several Canadian bases such as Frobisher (F″), Goose Bay (GB), Namao (N″), and Churchill (C) were developed for the United States Strategic Air Command. At the same time the Russians were building airfields for their Long Range Air Force in the northern USSR.

The first requirement for defence against air attack is early warning which serves a double purpose. First, it allows time to alert the defences and to vector interceptor aircraft towards the enemy bombers before they reach their targets. Its other and even more important purpose is to warn friendly bombers on the ground so that they can fly off before being destroyed. When bombers became faster, achieving high subsonic speeds as jet propulsion replaced propellers, the radar warning stations needed to be pushed further out from the targets. For the United States and Canada, further out meant further north, and led to the construction of the Distant Early Warning (DEW) line across the northern extremity of Alaska and the Canadian mainland, and thence over southern Greenland to Iceland. This was backed up by the Mid-Canada line across the 55th parallel. And the defence complexes in Alaska, Iceland, and Greenland were given not only radar for warning but interceptor aircraft as well. In a similar way the USSR installed air defences on its territory, including the Arctic perimeter, but with a much greater number of interceptors and surface-to-air missiles than were deployed by any other country.

When Canada deployed F-86 single-seat fighters to Europe, they were ferried on a route using Goose Bay, Sondre Stomfjord (SS), Keflavik (in Iceland), and Scotland.

At this time there was some concern in North America over the possibility that the USSR might seize an airfield in the Canadian north, to use as a staging base for air operations against targets further south. However, as the ranges of strategic aircraft increased, the return for such a risky venture became extremely questionable. As Sutherland wrote in 1962, 'From the Soviet point of view the question is: what advantage would accrue from establishing a lodgement in the Canadian Arctic? The answer seems to be, not very much. There is nothing of any particular strategic

value in the Canadian Arctic. The two great bastions of polar defence are Alaska and Northern Greenland. The Canadian Arctic is a sort of strategic desert lying behind these two strong points.'[5] It should be remembered, of course, that this was written prior to the discoveries of petroleum in the North American Arctic.

Both the United States Navy and the Royal Navy operated strike carriers which could supplement strategic bombing by land-based aircraft. Aircraft carriers could obtain their best coverage of targets such as Murmansk (M), Archangel (A), Leningrad (L), and the Baltic naval bases by sailing northbound through the GIUK gap into the Norwegian Sea (NS). As a counter to this the USSR emphasized operations against strike carriers by its submarines, surface ships, and aircraft. Soviet air-to-surface, ship-to-ship, and submarine-launched cruise missiles were designed specifically to oppose a carrier strike fleet.

Intercontinental ballistic missiles and the Arctic

Once the range of a ballistic missile had reached a few hundred miles, it increased at a remarkable pace. With the attainment of intercontinental ranges, the trajectories between the USSR and the United States were necessarily over the Arctic. For while a bomber could 'end run' a finite warning line if it had sufficient range, a ballistic missile cannot fly on a 'dog leg' trajectory. If it had appeared that the period during which missiles could attain ranges of only about 4000 nautical miles (nm) would be a long one, then some would probably have been emplaced in Arctic launching sites. However, once the attainable ranges had approached 6000 nm it was far more economical to choose sites for advantages such as convenience of access and supply.

Defence against intercontinental ballistic missiles (ICBMS) involves some of the same considerations as air defence. Their very rapid flight time (only about 30-35 minutes for a 6000-nm trajectory) does not allow much warning time, so that it becomes desirable to emplace the initial detection radars in forward sites. The United States installed its Ballistic Missile Early Warning System (BMEWS) in Alaska (at Clear, C″), Greenland (at Thule, T′), and England (at Fylingdales Moor, F′), permitting an ICBM launched from the USSR towards the United States to be detected before it had passed the apogee of its trajectory. However, defensive interceptor anti-missile missiles have been installed on an

extremely restricted scale, and this only in the vicinity of the defended targets: the Moscow district (M′) for the USSR, and at ICBM sites in North Dakota for the Americans, although the latter deactivated their installation at Grand Forks (GF) almost as soon as it became operational.

The Arctic and modern navies

The submarines which fought in World War II were unable to proceed very far underwater because their electric batteries were soon exhausted. The vast majority of the miles made good on a long voyage were 'steamed' on the surface using diesel engines. Very long cruising ranges were attainable in this way, however, allowing German U-boats to operate in the South Atlantic and Indian oceans, and the range was often extended by the transfer of fuel from oil tankers or 'milch cow' submarines. Nuclear propulsion has made it possible for the submarine to proceed submerged for unlimited distances. The main advantage of this is that detection by radar or visual sighting is ruled out. However, it also allows a submarine to penetrate under floating ice without the fear of being trapped with its batteries exhausted and no chance to surface for recharging.

The development of submarine-launched ballistic missiles (SLBMs) has given the submarine a new role quite separate from the former main one of attacking surface ships. It has become, with the ICBM and the long-range bomber, one of the 'triad' of strategic weapons. Moreover, with nuclear propulsion and the ability to remain submerged for months on end, it is the least vulnerable of the triad, and therefore the most reliable and stable for the purpose of strategic deterrence.

One similarity between the Arctic Ocean and the Mediterranean Sea is that of restricted exit to the main oceans of the world.[6] The Mediterranean has only two exits, Gibraltar and the Suez Canal. The Arctic Ocean is enclosed except for the GIUK gap, the Davis Strait (D′S′), and the Bering Strait (B). The GIUK gap includes the Denmark Strait (DS) between Greenland and Iceland, the passages between Iceland, the Faeroes (F), the Shetlands (S′), the Orkneys, and Scotland, and the Dover Strait between England and France. All the passages except the Denmark Strait are free of ice and are both deep enough for surface ships and submarines and shallow enough for moored mines. The Green-

land shore of the Denmark Strait is blocked by fast ice in the winter, but surface passage is usually possible towards the Iceland shore. The Denmark Strait would be difficult to mine.

To enter the Davis Strait, which lies between the west coast of Greenland and Baffin Island (BI), from the north, it is necessary to reach Baffin Bay (BB) by one of two routes.[7] Both routes, Baffin Bay, and a part of the Davis Strait are covered by ice for a large part of the year, but the water is deep enough to permit a submarine to make the passage submerged. The route closest to Murmansk leads from the Lincoln Sea into the narrow Robeson and Kennedy Channels, the Kane Basin, and the Smith Sound between Greenland and Ellesmere Island (EI). This passage from the Arctic Ocean to Baffin Bay is also known by the name of the Nares Strait (N'N'). The United States nuclear submarine *Skate* made the passage in 1962. The longer but easier route is through the Canadian Arctic archipelago, via the McClure Strait (or the Prince of Wales Strait), the Viscount Melville Sound, the Barrow Strait, and the Lancaster Sound. This route is also called the Parry Channel or, more frequently, the Northwest Passage, although the latter label is also applied to the more southerly route along the edge of the mainland. The Parry Channel has been negotiated by several surface ships, and by the nuclear submarine, USS *Seadragon*, in 1960.

With respect to the questions of sovereignty and law of the sea that submerged passage by submarine raises, it should be noted that the Robeson Channel, although only 10 miles wide at its narrowest, separates two countries (Canada and Greenland). However, both the Barrow Strait and the Prince of Wales Strait are less than 24 miles across at their narrowest points, so that Canada does not consider them to be international passages.

Another possible route for submarines from the Arctic to the Atlantic passes to the west of Baffin Island and enters the Labrador Sea (LS) through the Hudson Strait instead of the Davis Strait. However, this requires negotiation of the narrow Fury and Hecla Strait (FH), which has strong currents and is usually choked with ice, and of the shallow and icy Foxe Basin (FB); this route may not therefore be feasible for large submarines.

The remaining exit from the Arctic Ocean is the Bering Strait, separating Siberia from Alaska. Easily navigable by surface ships in summer, it is covered by ice in winter. With ice moving in the

current and piled up by high winds into 'rafts' of great depth, and with the Strait's shallow bottom, submarines have a dangerous passage. In its first attempt in June 1958 the USS *Nautilus* turned back from the deep ice and shallow bottom of the Chukchi Sea (CS), but the following month it made its passage through the Bering Strait to the North Pole.[8] Since then both the USS *Skate* (1959) and the USS *Sargo* (1960) have traversed the Bering Strait in winter.[9]

For surface ships, the area of the Arctic Ocean navigable in summer is an incomplete rim around the outer (ie southern) perimeter, with a wide opening out to the Atlantic via the Norwegian Sea (NS) and the Greenland Sea (GS). To the east of this wide Atlantic opening the Soviet coast is navigable all the way to the narrow exit to the Pacific through the Bering Strait, but if one continues along the North American shore it is not possible to pass north of the Canadian archipelago or Greenland on the surface. Of the Arctic water which is free of ice in the summer, only 4 per cent lies north of Alaska, Canada, and Greenland.[10] In the winter, the Norwegian coast remains free of sea ice, and surface navigation is possible as far as Murmansk. But the Gulf Stream has dissipated all of its warmth by then, and the White Sea ports such as Archangel (A) are frozen, as are the other ports of the USSR and of North America.

It is easy to see that the Arctic Ocean is far more important to the Soviet Union than to any other country. To leave the Baltic Sea or the Black Sea it is necessary to pass the Danish straits or the Dardanelles, both narrow and easily closed by a NATO power. Soviet ports on the Sea of Japan and the Sea of Okhotsk are often closed by ice, and exits to the Pacific from the former pass between Japanese islands. Only one port in the USSR offers a year-round exit clear of foreign coasts; so it is not surprising that Murmansk is the largest naval and submarine base in the world.[11]

Economic considerations in the Arctic

To turn briefly to commercial as opposed to naval shipping, the most important Arctic passage is the Soviet Northern Sea Route, in use since 1928, which leads from Murmansk eastwards along the coast of the USSR past the entrance to the White Sea and the mouths of a number of large northward-flowing rivers, and eventually turns the eastern tip of Siberia through the Bering Strait,

into the Bering Sea, and to Kamchatka and Vladivostok.[12] This route is open for only 130 to 150 days per year, and then usable only by ships with strengthened hulls assisted by icebreakers. It is most vulnerable to military interference at the Bering Strait and consequently a naval base has been established at Provideniya (P). The route forms an alternative to the Trans-Siberian Railway, which would be vulnerable to attack by land in a war between the USSR and China. The economic importance of Siberia is indisputable for it is estimated to contain 80 per cent of the Soviet Union's oil, natural gas, and coal,[13] as well as great quantities of lumber and iron.

At present there is no commercial sea traffic by NATO nations in the Arctic to compare to the Northern Sea Route, although there is a small amount of shipping in the Canadian Arctic and to Alaska for resupply in summertime, and in northern Norway all year round. However, the economic importance of the North American Arctic may increase dramatically if the initial discoveries of gas, and especially of oil on the Alaskan slope and the Canadian archipelago, should be followed up by other large strikes. The impact of such discoveries is already apparent in the Norwegian Sea, where drilling, extraction, and transportation are not complicated by sea ice. A key factor in the commercial exploitation of gas and oil discoveries in the Canadian Arctic will be the means of transportation from the sites to the refineries and consumers. Pipelines, the most reliable and economical means in temperate climates, have their drawbacks in the Arctic, especially for liquid oil, which may become too viscous to flow at low temperatures. Large tanker ships, very economical for carriage of oil when reliable navigation is assured, cannot transport gas unless it is liquefied by refrigeration. The movement of large tankers in the Arctic can pose very serious problems, as evidenced by the difficulties encountered by the *Manhattan* in its experimental negotiations of the Northwest Passage in 1969 and 1970.[14]

Not surprisingly the leaders in commercial Arctic marine navigation have always been Russian. They designed the first icebreaker (in 1898), the first nuclear-powered icebreaker (*Lenin*, 16,000 tons, launched in 1957), and the largest icebreaker (the nuclear-powered *Artika*, 25,000 tons), which now has a sister ship, *Ledokoly*. The United States Coast Guard has completed two new large and powerful oil-fuelled icebreakers (*Polar Star* and *Polar*

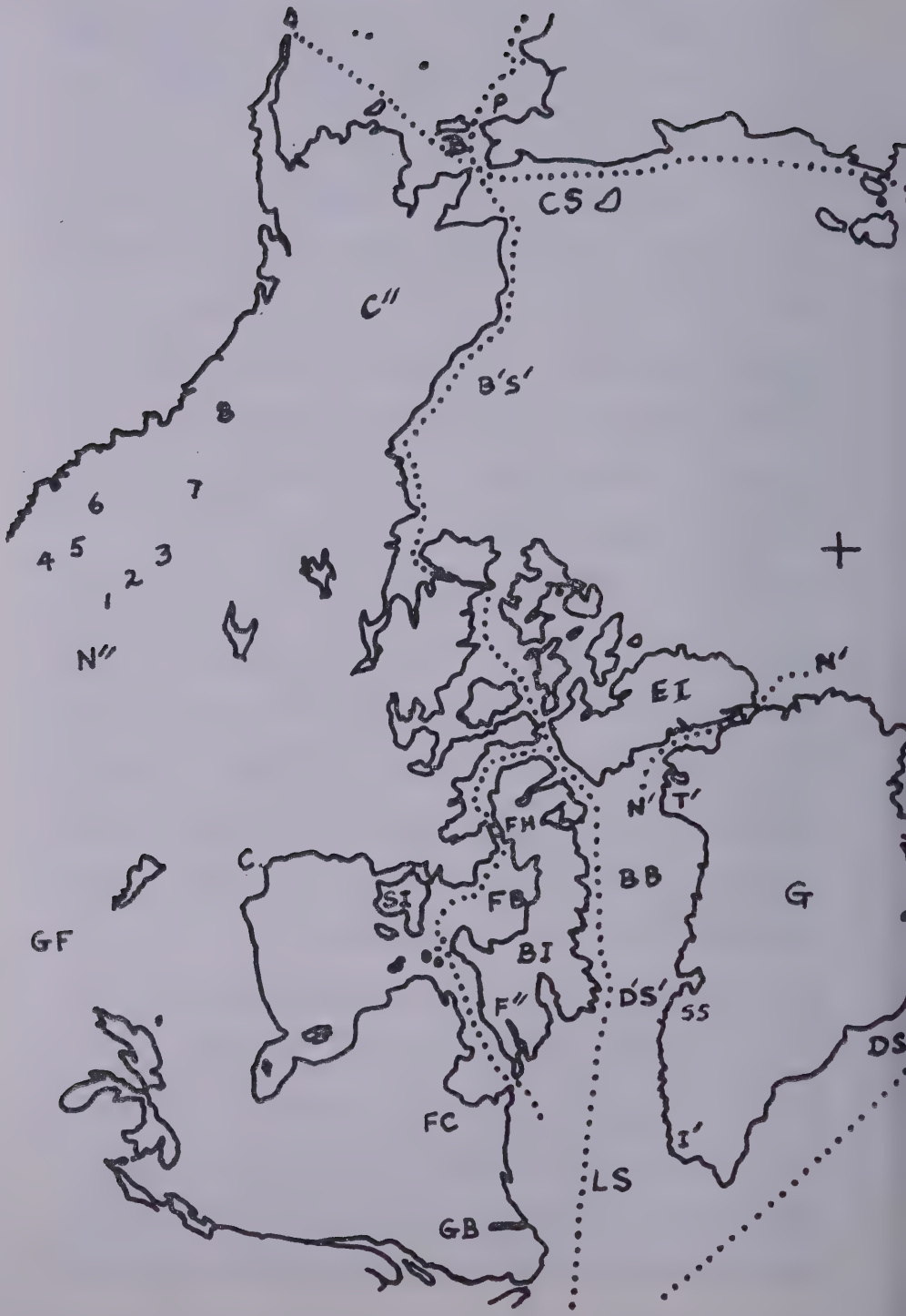
Sea, 12,200 tons each) and has been experimenting with large oil tankers designed to break their own paths. Most icebreakers now carry helicopters for ice reconnaissance. And assistance in following and forecasting the formation and movement of sea ice is now available from low-resolution earth satellites designed for weather forecasting or collecting data on earth resources.

If large quantities of oil are discovered in Arctic maritime areas not readily accessible to surface ships, it is possible that submarine tankers may become commercially feasible. These might tow large containers of oil, rather than stowing it internally inside their outer hulls. It is also conceivable that an oil lift by very large, specially designed aircraft would be cost-effective. Whatever the problems of transportation, it seems certain that the demand for energy will make them worth solving if raw material is discovered in significant quantities. There could be tanker ports, pumping stations, even refineries, in the Arctic by the 1980s. If the North American economy does not meet the challenge, Japanese and European commercial interests may force the issue.

Marketable quantities of minerals other than oil may also be discovered, especially now that techniques for underwater exploration at ever greater depths are being developed. There are still problems to be overcome regarding ice, whose irresistible motion can damage or remove drilling platforms or almost anything else on or near the surface of the sea, and it may be that there will be important new uses for submersible vehicles and installations on the sea bottom, or even attached to the bottom of the icepack. There still remains an enormous, virtually unexplored area of seabed beneath the Arctic icecap. Any one of the Arctic islands could suddenly assume great importance if valuable resources were found in the adjacent seabed.

Geostrategic features of the Arctic and northeast Atlantic

For many purposes it is useful to separate discussion of general nuclear war from that of all other forms of competition. The main geostrategic considerations regarding general nuclear war have been covered already; the dominating fact is that the means of delivery of thermonuclear warheads now provide ranges and accuracies adequate to free planners of almost all geographic constraints. Trajectories of most strategic missiles and aircraft launched against the homeland of either superpower would cross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GB

A — Archangel
B — Bering Strait
B′ — Bergen
BB — Baffin Bay
BI — Baffin Island
BS — Barents Sea
B′S′ — Beaufort Sea
C — Churchill
C″ — Clear
CS — Chukchi Sea
DS — Denmark Strait
D′S′ — Davis Strait
EI — Ellesmere Island
F — Faeroes
F′ — Fylingdales Moor
F″ — Frobisher
FB — Foxe Basin
FC — Fort Chimo
FH — Fury and Hecla Strait
FJ — Franz Josef Land
G — Greenland
GB — Goose Bay
GF — Grand Forks
GS — Greenland Sea
I — Iceland
I′ — Ivigtut
K — Kola Peninsula
K′ — Kirkenes
KS — Kara Sea
L — Leningrad
LS — Labrador Sea
M — Murmansk
M′ — Moscow
N — Narvik
N″ — Namao
N′N′ — Nares Strait
NS — Norwegian Sea
N′S′ — North Sea
NZ — Novaya Zemlya
P — Provideniya
S — Svalbard (Spitzbergen)
S′ — Shetlands
SI — Southampton Island
SS — Sondre Stomfjord
T — Tromsö
T′ — Thule
W — White Sea
WC′L — White Sea Canal
1 — Grande Prairie, Alta
2 — Fort St John, BC
3 — Fort Nelson, BC
4 — Williams Lake, BC
5 — Prince George, BC
6 — Smithers, BC
7 — Watson Lake, Yukon
8 — Whitehorse, Yukon

the polar regions. However, the warning systems needed to provide surveillance of northern aerospace possess very long ranges and can be based in friendly territory or in orbiting satellites. As regards ballistic missile submarines, the chief geostrategic factor related to the Arctic is the unique dependence of the Soviet Navy on their bases on the Kola (K) peninsula.

Although the possibility of general nuclear war deserves continuing concern, many feel that its appalling destructiveness, now inescapable for both superpowers, has rendered it extremely unlikely. It is argued that strategic nuclear deterrence, through the certainty of mutual assured destruction, is so effective that it has produced a stalemate at the maximum level of violence. While we can all be thankful for this welcome development, we can certainly not assume that conflict at lower levels of violence is thereby prevented. On the contrary, it is probably more likely now that the ultimate sanction has been effectively neutralized. Moreover, there are many opportunities, below the level of any actual violence, for the exercise of military, economic, and political power as a means of increasing influence or gaining concessions.

Consequently, an analysis of geostrategic features of the Arctic and northeast Atlantic[15] needs to give great weight to the possibilities of manœuvrings and conflicts involving limited levels of threat and hostilities, extending all the way from economic competition to large-scale conventional warfare. Most of the earlier part and nearly all of the remainder of this paper is focussed on the importance of the northern regions for military operations falling short of general nuclear war.

The main geostrategic features of the Arctic which were demonstrated in World War II were : (1) the power of forces based in Norway to harass naval operations out of the Kola area; (2) the importance of the possession of Norway for a naval power wishing to operate into the Atlantic out of Baltic ports; (3) the importance of Iceland and Greenland to the Atlantic powers for the defence of the supply routes from North America to Europe; and (4) the constraints placed on the Arctic power (between 1940 and 1945 this was Germany) by the GIUK gap. In a possible future confrontation between NATO and the Warsaw Pact, the USSR would be the Arctic power and the power working to operate into the Atlantic out of the Baltic. NATO would be the Atlantic power working to

maintain the supply routes from North America to Europe, and to harass naval operations out of the Kola area.

The strategic significance of Norway, Iceland, and Greenland is very great indeed. The almost total dependence of the USSR on Murmansk, its only unscreened year-round exit to the Atlantic, makes it most improbable that the Russians would tolerate the conduct of hostile operations, whether by sea, land, or air, from adjoining territory in north Norway. Norwegian sensitivity to this situation has caused it to deny allied troops or nuclear weapons a permanent presence in Norway, lest they serve as a provocation to the Russians.[16] Svalbard is demilitarized by an international treaty. The present military weakness of the region almost invites a Soviet initiative, whereas NATO preparations and an obvious determination to hold and utilize northern Norway would offer a significant deterrent to aggressive action.

The geography of the northern cap of Scandinavia makes it easy for well-equipped Soviet land forces with very strong air support, both now based in the vicinity of the Kola peninsula, to seize the most northerly Norwegian coastal areas from the sea, to move overland through Kirkenes (K′), to cross through the 'Finnish wedge' to Tromsö (T), or, if Sweden were to be entered as well as Finland, to take Narvik (N). (If a defensive action were initiated locally against any such Russian move, support from NATO or even the more populous part of Norway is far away.) And if the USSR could disperse some of its warships into the Norwegian fjords, they would be safe in the event of a nuclear strike on Murmansk.

If, however, the GIUK gap could be closed between the Shetlands (S′) and southwestern Norway (say at Bergen, B′), instead of at Dover, then the Arctic power would be denied entrance into the North Sea (N′S′), the Skagerrak, the Kattegat, the Danish straits, and the Baltic Sea. In a contest between NATO and the Warsaw Pact this could be the decisive factor. If the Soviet Northern Fleet cannot enter the North Sea, then the Warsaw Pact is prevented from exchanging ships larger than those able to negotiate the White Sea Canal (WC′L) between the Baltic and the Arctic, which is frozen for more than half of the year. If the North Sea and the Baltic exits can be controlled by NATO, then the sea communications among Norway, the United Kingdom, Denmark,

Germany, Netherlands, Belgium, and France remain intact. And in situations short of violent confrontation, detection of inbound and outbound crossings of the GIUK gap by submarines or surface ships would add valuable information to NATO's intelligence.

It would seem then that a very high priority for the USSR would be the neutralization of bases in northern Norway, Iceland, and Greenland. Occupation might not be necessary if NATO operations could be prevented by diplomatic, political, or military means, although use of the fjords of northern Norway would reduce the vulnerability of the Soviet Northern Fleet. If passage through the GIUK gap were assured, then missile and attack submarines could move freely into the Atlantic from Murmansk. If Soviet aircraft, surface ships, and attack submarines can operate in the Norwegian Sea, then the approach of NATO's strike carriers can be contested before they come close to their strategic targets in northwest Russia. Short of a heavy strike by nuclear weapons, it seems most unlikely that carriers could inflict serious damage on installations in the Kola peninsula without suffering heavy losses themselves.

A consistent theme of Soviet strategy, particularly evident in the period just before and after World War II, has been the creation of buffer zones in the territories immediately adjoining the USSR. The demands made on Finland in 1939 and the subsequent Russo-Finnish war gave the Russians a deeper band of national territory around the approaches to Murmansk and Leningrad, with the adjacent state serving as a security buffer. The alacrity with which the USSR seized the eastern part of Poland in 1939, and in 1940 the presumably friendly territories of Lithuania, Estonia, and Latvia on the Baltic, and Bessarabia and northern Bukovina on the Black Sea testifies to the desire for buffers against Germany. Each of these regions has been appropriated into the USSR itself, together with the Kurile Islands and the southern half of Sakhalin Island close to Japan. And, beyond this newly acquired national territory in the west, the Warsaw Pact partners can be considered as buffers between NATO and the USSR.

Although it may not be possible to construct buffer zones on the maritime frontier by physical annexation followed by territorial sovereignty, it would be entirely consistent with Soviet strategic practice if they should make determined efforts to establish maritime buffers and to push them outwards whenever there is an opportunity.

Herrick's pioneer book on Soviet naval strategy[17] and various articles by MccGwire[18] have expounded the defensive theme, which has been confirmed by the type of ship and the pattern of naval exercises commonly seen in the 1950s and 1960s. However, the writings of Admiral Gorshkov,[19] the expansion of the Soviet navy,[20] the recent appearance of aircraft carriers, and the world-wide pattern of Exercise Okean[21] in 1975 all suggest that coastal defence has already become defence in depth and is well on its way towards an assertive extension of a global naval presence based on a strong capability for offensive operations.

Because of the importance of the Northern Sea Route to it, the USSR has shown sharp hostility to probes by United States ships into areas along the Soviet northern coast.[22] However, the Soviet Arctic islands and the permanent icepack should keep the sector of the polar region between the White Sea and the Bering Strait as Russian as the USSR would wish. The only other islands in the Arctic eastern hemisphere that could be attractive to it would be Svalbard. With respect to control of ocean areas, once the Barents Sea (BS) and everything to the east of it is secure, the buffer zones would be the Norwegian Sea and the Greenland Sea, followed by the GIUK gap. And to control these buffer zones it would be desirable to minimize or neutralize NATO activities in Norway, Iceland, and Greenland.

The Bering Strait (B) has strategic significance because it is essential to the Soviet Northern Sea Route. It is also necessary for entry of American and Canadian shipping into the Beaufort Sea (B'S'). The closest approach of superpower territories comes between Big Diomede Island (USSR) and Little Diomede Island (USA), which lie only three miles apart in the middle of the Bering Strait. However, Alaska is unlikely to provide a land route for the invasion of North America from Siberia. Global stability has reason to be grateful for 'Seward's Folly,' in which Alaska was purchased from Russia for the sum of 7.2 million United States (1867) dollars.

Technological developments likely to be significant for Arctic operations

Arctic operations at sea and in the air during World War II were dominated by bad weather and poor visibility. The Murmansk convoys could be operated with heavy but bearable losses during

most of the year because they could make most of their transit at some distance from the coast, and air reconnaissance could not easily establish and maintain contact in the short poorly lit days of the Arctic winter. But, as pointed out, it became necessary to suspend the convoys during the summers. The German heavy warships were able to survive for a long time by hiding in Norwegian fjords and by using smoke screens when bomber attacks were mounted.

Today, with highly developed radars on every military aircraft and warship, neither night nor smoke offers reliable concealment. When visibility is good, the high-definition optics of reconnaissance satellites allow large areas of oceans or coasts to be scanned at a much greater rate than is possible with aircraft or ships. And infrared techniques, depending upon the detection of heat emission, are better against a cold background than anywhere else. Moreover, having found a ship, a modern attack aircraft has formidable weapons with which to destroy it.

In World War II, sonar was useful only when submarines approached within a mile or so of the escort ships. Today it can achieve far greater ranges whether based on ships, aircraft, submarines, or systems fixed to the sea bottom. Anti-submarine weapons have been improved in range and lethality with the development of homing torpedoes and the means of delivering them by rocket. Escort ships carry anti-submarine helicopters. The result of these developments is to enable a barrier to the passage of submarines to be much more effective, provided that a sufficient concentration of anti-submarine submarines, aircraft, and possibly ships can be maintained over a finite area of the sea in which the bottom permits the employment of fixed or moored detection systems. This type of anti-submarine barrier could be used to close the GIUK gap; it might not be effective, however, in areas of the Arctic covered by floating ice, since ships and aircraft could not be used and the sonar instruments of killer submarines might be impeded.

Although anti-submarine techniques have improved, it is probable that the effectiveness of submarine systems has improved even more. Nuclear propulsion allows an attack submarine when submerged to move faster than a surface convoy, and several types of submarine-launched anti-ship missiles have ranges far in excess of any torpedo. Moreover, the reconnaissance of surface

targets by co-operating aircraft or satellites can be used to direct the submarine into the best area to make its interception, or perhaps to perform mid-course guidance to missiles launched at very long range.

This factor of improved effectiveness of submarines against surface ships is no different in the Arctic than elsewhere. But in a conflict between NATO and the Warsaw Pact it is NATO which will depend on the maintenance of seaborne supply, and which will need to succeed in the protection of shipping. The most effective defence could well prove to be a sealing of the GIUK gap against the passage of Soviet attack submarines from their bases in the Arctic and the Baltic.

For continental air defence, radar warning lines were built across the northern extremities of both North America and the Soviet Union. Two new developments may supersede ground-based horizon-limited radar for the detection and tracking of aircraft. These are over-the-horizon backscatter radar (OTH-B) and the airborne warning and control system (AWACS). OTH-B extends the radar range far beyond the horizon by using paths of propagation reflected from the ionosphere. AWACS mounts a large radar in a long-range aircraft, and provides it with electronics able to discriminate the signals from an aircraft target in spite of competing reflections from the ground or the sea. AWACS also carries the personnel, displays, and communications which enable interceptor aircraft to be directed towards the target. OTH-B and AWACS have a special significance for operations in the Arctic because of the cost and difficulty of maintaining a chain of ordinary radars on the ground. Moreover, AWACS can be sent anywhere on short notice, and works as well over ice and snow as over any other surface. A drawback of OTH-B is its dependence on the ionosphere, which behaves in an erratic and unpredictable manner in the auroral zone. This zone does not occupy all of the Arctic, but could cause the performance of OTH-B to be unreliable in certain extended northern areas.

If it is desired to intercept unfriendly or unidentified aircraft over a large area such as the Arctic where air bases are widely separated, the interceptors will need to have very long range. And for it to be possible to identify and, if necessary, to attack very high performance aircraft, the interceptors must be capable of great speed and high altitude, and will need a large and powerful radar

and long-range air-to-air missiles. The USAF did develop such a long-range high-performance interceptor, the F-12, but decided that it was too expensive to produce. It seems probable that both the United States and the Soviet Union may install advanced air detection systems such as OTH-B and AWACS, which would permit them to perform effective surveillance of air activity over the Arctic. However, both powers may choose to provide the capability to intercept only over the more limited areas that can be covered from established air bases by interceptor aircraft designed primarily for battlefield air superiority, and with combat radii less than ideal for Arctic operations. For the air defence of vital point targets, modern surface-to-air missiles may well be the most cost-effective weapons.

The newest bomber aircraft, such as the Soviet Backfire and the American B-1, do not outrange the current intercontinental bombers. Very long range has become less important than high speed at low altitude. As a consequence a long-range mission is likely to depend on one or more air refuellings. This could be the vulnerable feature of Arctic operations and might increase the potential need for forward bases for both offensive and defensive operations.

A substantial change from the conditions of World War II is the increased vulnerability of small isolated installations to attack from the air. With means of reconnaissance which are much less dependent on good visibility, and weapons which may be targetted with great precision, today's long-range aircraft could destroy almost any small lightly defended base in the Arctic with the greatest of ease. Life in the Arctic is quite precarious enough without manmade hostile action and could easily be rendered impossible under attack by modern weapons.

None of these discussions has been in the context of nuclear warfare. Should a conflict escalate to the use of nuclear weapons at sea, the prospects for merchant shipping or even the sea transport of large numbers of troops would be poor. If nuclear weapons were used against harbours, it is unlikely that many of the ships or dock facilities would survive. However, with the exception of the Murmansk naval base, and perhaps some key NATO air bases, it is doubtful that there would be many land targets in the Arctic of a size and importance to warrant attack by nuclear weapons.

At present, ICBM launch sites and the very limited number of

active anti-ballistic missile (ABM) interceptors are located well south of the Arctic regions. There are ballistic missile early warning radars in the Arctic, but these are probably less important today than the latest detection systems which are based on the geo-stationary satellites. If the SALT agreements recover their momentum, there may be no further emphasis on Arctic installations. However, should active ABM defence be revived it is quite possible that offensive developments in ICBMs, such as decoys, multiple warheads, manœuvring re-entry bodies, or use of precursor nuclear bursts would induce offsetting defensive measures requiring the installation of forward and widely dispersed sensor systems which could be based on land, sea, or ice, or in the air. In this case the Arctic would become the area for the forward sensors if not the active defences.

Another very significant development in strategic missiles, not inhibited by SALT, is the increase in the range of submarine-launched ballistic missiles (SLBMs). When the Russians have hundreds of SS-N-8 missiles at sea, with a range of 4200 nm, and the Americans have Tridents able to reach 4000 nm, both fleets of nuclear submarines will have their choice of the world's oceans as patrol areas. Kola-based Soviet submarines need not traverse the GIUK gap. It seems unlikely that other strategic submarines would prefer to use the Arctic unless anti-submarine defence should drive them out of the warmer seas. However, it is possible for these submarines to remain under the ice for extended periods, and to find 'polynyas' in the icepack through which they could launch their missiles. It is also possible for them to lurk near the edge of the pack and emerge to launch. Anti-submarine warfare under the icepack would almost certainly depend on anti-submarine submarines, and it is not known how much their effectiveness might be impeded by the presence of the ice and the ability of their quarry to use it as an aid to concealment and evasion. What does appear certain is that the need to close to within a few hundred miles of strategic land targets will not be a factor unless the attacker intends to fire low-trajectory shots with short time of flight, in the hope of evading detection of the missiles in flight.

A new family of weapons of great potential importance is that of the strategic cruise missiles, which can be projected from submarines, surface ships, or aircraft, or from fixed or mobile

launchers based on land. There is no physical principle limiting the operational range of cruise missiles, but if an arms control agreement should fix the maximum range to a limit well below intercontinental distances, there might be a move to place them in certain Arctic territories such as eastern Siberia, Alaska, Kola, or northern Norway, where valuable targets are available within ranges of a few hundred miles. Such a development would probably induce countermeasures in the form of low-altitude anti-aircraft defences.

Significance for Canada

In making its strategic plans and decisions, Canada, whose Arctic frontage is second only to that of the Soviet Union, needs to take into account strategic and military factors as well as the more prominent economic, social, and environmental considerations. However, it would appear that the strategic and military factors are not particularly pressing at the moment, insofar as competition with the Warsaw Pact in the Canadian Arctic is concerned. A confrontation between the Warsaw Pact and NATO could very well highlight the strategic significance of Norway, Iceland, and Greenland. As a contribution to NATO's military capacity Canadian maritime forces could perform invaluable service in the Denmark Strait and the North Atlantic sea lanes. But the Canadian archipelago and the adjacent waters of the Arctic Ocean are far more likely to be the scene of economic competition or possibly of legal and political disagreements over sovereignty than to be an area of military confrontation between NATO and the Warsaw Pact.

A similar situation exists regarding military aerospace activity, unless there should be a resurgence of ballistic missile defence. It will always be true that northern Canada lies directly between the USSR and the United States, but the requirements for early warning to the strategic centres of those two countries may continue to be satisfied without the need for extensive installations in northern Canada.

As regards military operations on land, the most sensitive Arctic area is northern Norway. Canada has recognized this situation and is working in conjunction with its NATO partners to ensure that there is an effective plan for the defence of northern Norway.

Future strategic competition in the Canadian Arctic is more

likely to be dominated by economics or possibly by sovereignty than by military imperatives. The Canadian Armed Forces may well have a significant role to play in both of these activities. But in purely military terms, the significance of the polar regions is mainly in the maritime sphere, and specifically in the waters surrounding Norway, Iceland, and Greenland, rather than in Canada.

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